Agenda Item
Woodson Bridge Ecosystem Restoration Project

Agenda Description

Consider the approval of Resolution 08-09 for the Woodson Bridge Ecosystem Restoration Project (Project) granting the Executive Officer the authority to provide a letter to the U.S. Army Corps of Engineers regarding its continued interest and financial capability to be one of the non-federal sponsors of the Project under the cost-shared Continuing Authorities Program Section 1135 of the Water Resources Development Act of 1986.

Project Location

The project is located approximately 15 miles south of the city of Red Bluff along the Sacramento River. The proposed study area encompasses a 7-mile river reach that ranges from River Mile 216 to River Mile 223. The location of the proposed project is shown in Figure 1.

Project History

In 1958, the Chico Landing to Red Bluff Project was constructed as a modification to the Sacrament River Flood Control Project. The intent of the project was to provide bank protection along 50 miles of the Sacramento River between Chico Landing and Red Bluff.

It has now been determined that the Sacramento River is constrained at various locations by riprap placed during this 1958 project. The Kopta Slough area between River Miles 216 and 223 is a location where flow through the Sacramento River is restricted. Loss of shaded riverine aquatic habitat is a direct result of the revetment placement and loss of riparian forest has resulted from increased erosion along the banks where revetment does not exist.

The Project aims to restore the natural fluvial function of the river where it is currently restricted due to the revetment. This would in turn increase shaded riverine aquatic habitat for a variety of endangered species of salmon as well as restore river stability related to sediment transport, hydraulics and geomorphic functions. In addition, the Preliminary Restoration Plan includes alternatives involving the removal of invasive species and replacement with native plants to stabilize soft eroding banks near the Woodson Bridge.

The Army Corps of Engineers has stated that they would like to partner with the Central Valley Flood Protection Board (Board) and Tehama County on this project. This partnership would result in a reduction of maintenance for DWR along this segment as well as provide erosion protection at Woodson Bridge. In the Preliminary Restoration Plan, the Corps states that the State Reclamation Board indicated they are willing to work on this Project in partnership with Tehama County and the Corps. A letter of intent is required from the non-federal sponsor at this time prior to the Corps completing the Detailed Project Report.

Design

The Woodson Bridge Ecosystem Restoration Project proposes to investigate three restoration alternatives which are outlined in the Preliminary Restoration Plan. The alternatives have varying degrees of cost and involvement. Each alternative will be fully evaluated in the Ecosystem Restoration Report based on cost, overall quantifiable benefits to the flood control project, and the quantity and quality of the forecasted increase in riparian habitat.

Need for Resolution 08-09

A variety of local interests have expressed a desire for a project at Kopta Slough and Woodson Bridge. From the flood control perspective, local interests support reducing erosion at Woodson Bridge and the State Park. There is also a concern that the current configuration of the Sacramento River potentially creates a backwater effect upstream of Woodson Bridge. Removing the rock revetment in some locations upstream of Woodson Bridge will allow the natural fluvial process to take place, resulting in a more balanced sediment yield and allowing the river to recapture Kopta Slough as part of the floodplain. Removing portions of revetment also allows shaded riparian habitat to be established.

There is the potential for two separate projects at this location. One would be a cost-shared project with the Corps to remove revetment, restore Kopta Slough, and possibly protect Woodson Bridge. The other would be a State funded restoration project to pursue advanced mitigation. DWR is currently funding a feasibility study to determine potential mitigation sites in this area which can be used for future maintenance projects.

Resolution 08-09 seeks to verify support for the cost-shared project that will remove revetment to allow the Sacramento River to reconnect to its historic floodplain while restoring habitat and stabilizing the banks near Woodson Bridge. The Resolution does not obligate the Board to enter into a Project Partnering Agreement at this time, but provides the authority for the Executive Officer to send a letter of intent to the Corps. The Board will have future decision points for modification to the design and choice of alternatives before entering into an agreement to assure the State's interests are met.

Supporting documents contained in this packet

- Resolution No. 08-09
- Preliminary Resolution Plan, January 2003
- Proposal to Complete a Feasibility Study for Kopta Slough Flood Damage Reduction and Habitat Restoration Project, 2007
- Letter sent to the Corps on April 18, 2008

Preliminary Resolution Plan
Drafted by the U.S. Army Corps of Engineers
January 2003

Continuing Authorities Program Section 1135 Ecosystem Restoration Project
Woodson Bridge, California
Preliminary Restoration Plan

January 2003

1. Project. Woodson Bridge, California, PWI 172742 .

a. The existing Corps project constructed in this study area is named " Sacramento River, Chico Landing to Red Bluff, California."

b. The Sacramento River, Chico Landing to Red Bluff Project was authorized in 1958 as an extension and modification of the Sacramento River Flood Control Project. The project provided for bank protection along 50 miles of the Sacramento River between Chico Landing and Red Bluff and for flood plain zoning along the river upstream to Keswick Dam. The purpose of the flood plain zoning was to limit development and maintain a floodway area that would safely carry maximum flood control releases from Shasta Lake. The project was intended to reduce erosion and stabilize the main river channel, protecting urban, residential, riparian, and agricultural lands, and to reduce sediment in the river, which could impair downstream flood control or navigation.

2. Location. Woodson Bridge State Recreation Area is east of Corning in the northern part of the Sacramento Valley and about 15 miles south of Red Bluff. The study area includes a 7-mile river reach and associated riparian corridor from River Mile 216 downstream of Woodson Bridge State Recreation Area through River Mile 223, upstream of the Vina Woodson Bridge. The study area includes Kopta Slough and the mouth of Deer Creek, both of which include high quality shaded riverine aquatic habitat. The area also includes 2.2 miles of rock revetment (previous Corps bank stabilization project), and 6.3 miles of shaded riverine aquatic habitat, and 0.4 miles of eroded banks (swallow habitat.) The location of the proposed restoration project is shown in Figure 1A. The proposed project modifications are shown in Figure 1B.

3. Description of Proposed Ecosystem Restoration.

a. What is Being Proposed?

The potential Corps project in partnership with the State Reclamation Board and Tehama County would include:

- Re-connect the Sacramento River to its active flood plain near River Mile 220 by modifying the existing Corps bank protection project

- Restore aquatic, riparian, and adjacent terrestrial habitats between Kopta Slough and the river for use by migratory and neo-tropical birds that migrate along the Sacramento River corridor, listed species and other wildlife species

- Remove exotic invasive plant species and replace with native plants that help stabilize banks near Vina Woodson Bridge

- Restore stability and river form and pattern of the hydrology, hydraulics, sediment transport, and morphologic functions near River Mile 220

- Reduce bank erosion to improve water quality by reducing non-point source sediment in the Sacramento River which would benefit fish, wildlife, aquatic invertebrates, and their habitat; which would subsequently provide benefits to the aquatic ecosystem of the Sacramento River

b. Corps Project Features or Operations to be Modified. The existing Corps rock revetment project located between River Mile 218.5 and 220, authorized in 1958, would be modified by either rock removal or the cessation of maintenance after further analysis and data collection are completed during the detailed project report or feasibility phase. Proposed modifications are shown in Figure 1B. The Sacramento River would once again meander and reconnect to Kopta Slough as it did historically for many years. 300 acres of disturbed riparian vegetation are located to the west of the rock revetment project. The existing rock revetment protected former agricultural lands that had once been riparian forest. The rock revetment is not natural and has prevented nature's processes of sediment transport, water transport, and native vegetation from growing. The land use in the area has changed since 1958 and the majority of the land in the study area is used for open space and habitat at this time. The Nature Conservancy is currently managing the State owned land where up to 300 acres of riparian restoration is proposed.

c. Major Features of the Proposed Project.

- Reconnect the Sacramento River to its historic flood plain
- Restore aquatic, riparian, and associated terrestrial wildlife habitat through new plantings
- Utilize bioengineering methods that combine rock with new riparian vegetation to help stabilize river banks and provide wildlife habitat

d. Why is the Project Proposed?

The Sacramento River is constrained in some places by channel riprap and levees. Natural channel migration of the Sacramento River into Kopta Slough, which is unable to occur, is a natural stream function that sustains riparian forest structural heterogeneity. Channel migration performs many important riparian landscape and aquatic ecological functions that are necessary for the survival of many species. Preservation and restoration of aquatic habitat is considered important in providing feeding, burrowing, escape and reproductive cover for a variety of fish and wildlife species, including bank swallow and all runs of Chinook salmon. The study area as of 1998 contained less of the original acreage of the plant communities that use to exist along the Sacramento River according to Sacramento River Conservation Area Council (SRCA 1998). These habitats include Valley Oak Woodland, Great Valley Mixed Riparian Forest, Great Valley Cottonwood Riparian Forest and Great Valley Willow Scrub. This plant community is sufficiently rare to be tracked in the California Natural Diversity Database and should be restored and preserved for fish and wildlife habitat. According to Fish and Wildlife Service and the Department of Fish and Game several State or Federally listed species occur within the study area including the bald eagle, Swainson's hawk, western yellow-billed cuckoo, bank swallow, willow flycatcher, and valley elderberry longhorn beetle. Five species of fish are threatened or endangered or candidates for listing including the spring-run Chinook salmon, winter-run Chinook salmon, fall and late-fall Chinook salmon, steelhead, and Sacramento splittail.

e. Ecosystem Degradation Recorded in the Area. Human induced changes to the Sacramento River, including bank protection, gravel mining, riparian vegetation removal, flow regulation, and

flood control, have resulted in a number of physical and ecological effects. According to DWR's report *Woodson Bridge State Recreation Area Long-Term Solutions Study Working Draft (1998)* since 1896, the Sacramento River has moved back and forth in a meander belt that is more than 4,300 feet wide. For 42 years the river occupied Kopta Slough along the west bank. Currently, a former bank protection project authorized in the 1950's near the upstream end of the slough is preventing the river, or portions of it, from reoccupying the slough. DWR has been monitoring changes in bank erosion, bank composition, river length, depth, width, sinuosity, and floodplain deposition as part of the *Sacramento River Bank Erosion Investigation* (DWR 1994). Bank protection has reduced a source of salmon spawning gravel from freshly eroded banks and has over time, decreased the number of preferred spawning areas in multiple channel areas, chute cutoffs, point bar riffles and areas near islands. Because of flood protection provided by Shasta, Keswick, and Whiskeytown dams and extensive levee construction and bank protection along eroding banks, most of the rich high terrace soils and original riparian forest have been converted to agricultural and other uses. The Valley Oak Woodland habitat is under represented in the study area, with only 364 acres left. Wildlife populations have also declined due to loss of riparian habitat and suppression of the natural processes that maintain density and diversity of habitat within the riverine environment. Valuable cropland and orchards are routinely lost due to erosion. Campgrounds, road, levees, and bridges are also at risk.

Expected With and Without Project Conditions.

The expected future without-project conditions in the potential project area are:

(a) The river will erode approximately 40 or more acres over the next 25 years.

(b) Existing topography will change as banks continue to erode and the channel will change as the river continues to erode the banks.

(c) Reduction in mature stands of Valley Oak Woodland and Great Valley Mixed Riparian Forest will occur. It is estimated that approximately 15.3 acres of mature Valley Oak Woodland, 8.3 acres of Great Valley Mixed Riparian Forest and 0.4 acres of Cottonwood Forest will erode into the river. The Mixed Riparian Forest contains several remaining stands of extremely old sycamore trees, which are not found in other stands within the study reach. The loss of plant communities would than cause loss of habitat for birds and wildlife habitat as well.

(d) Some hiking and nature trails at the State Recreation Area would be lost. The gravel bar upstream of the bridge used for boating, fishing, swimming and sunbathing could be lost as well.

(e) Over the long-term channel changes could impact, through flooding or erosion, the loss of South Avenue and Vina Woodson Bridge.

The expected with project conditions would be:

(a) This project would result in a reduction or in halting of erosion of the Valley Oak and Mixed Riparian Forest on the left bank of the river.

(b) Some of the river hydrology will be restored. The river may recapture Kopta Slough via an old channel where it historically flowed, or it may split, with a portion of the river flowing down Kopta Slough. Beneficial effects to the existing riparian vegetation are expected to occur within the existing meander belt of the Sacramento River.

(c) Fish and wildlife habitat would improve due to new plantings and bioengineering techniques along the stream bank near Vina Woodson Bridge.

(d) Accelerated rates of bank erosion affecting riparian habitat at South Avenue or Vina Woodson Bridge would be minimized significantly.

(e) Continued recreational benefits would be preserved – public boating, swimming, fishing and sunbathing upstream of the bridge could continue under with project conditions

Expected Outputs and How They will be Measured: The Corps would measure habitat outputs by the number of acres and creek miles of habitat gained or restored. An incremental cost analysis would be used by the Corps to determine the cost effectiveness of each alternative. The potential outputs for this project would be:

- Restore and preserve up to 300 acres of riparian habitat between Kopta Slough and the Sacramento River

- Restore up to 1500 linear feet of riverbank vegetation to create wildlife habitat and prevent bank erosion utilizing bioengineering techniques

- Restore natural floodplain development by allowing unconstrained river migration between river miles 219 and 221

f. Importance of the Proposed Outputs. The significance of this Section 1135 project would be:

It would restore river and riparian habitat for the State and Federally threatened bald eagle, Swainson's hawk, yellow-billed cuckoo, the bank swallow, willow flycatcher, the fall and late fall Chinook salmon, spring-run Chinook salmon. It would help protect and restore mixed riparian forest, herb land, riparian scrub, and cottonwood forest that are in decline. Ecologically, the restoration of the Sacramento River to a naturally functioning floodplain would help offset past land use and river alteration activities that have been contributing to excessive sediment pollution and bank erosion which have adversely affected fish and wildlife species.

g. Lands, Easements, Rights-of-Way, Relocations, and Disposal Areas (LERRD's).
South and east of Vina Woodson Bridge are seven large parcels of land owned by the federal government (administered by the U.S. Fish and Wildlife Service) that comprise more than two miles of east river bank property. The non-federal sponsor would be credited for the state-owned land used in this proposed project. At this time that would include over 300 acres for riparian plantings, two or three reaches up to 1500 linear feet each of stream bank along the Sacramento River, and the acreage between the Sacramento River and Kopta Slough to be determined in the feasibility stage. LERRD's consist of over 300 acres of state owned land (fee title). There should be no acquisitions required as the non-federal sponsor already owns the land. It has been estimated that project lands may cost approximately $3000 per acre and other acquisitions for a total of $1,000,000. Real Estate Division will provide more detailed appraisals of land in the detailed project report phase.

h. Relationship of the Proposed Project to Other Federal or Non-Federal or Completed Projects and Regional or Watershed Plans The Deer Creek Watershed Conservancy, an

organization of watershed landowners, has proposed funding from CALFED to conduct a feasibility study for an ecosystem restoration and floodplain management project for lower Deer Creek which is a tributary flowing into the Sacramento River near river mile 219.6. Deer Creek is one of only three streams in the Central Valley still supporting wild populations of the federally threatened steelhead trout and fall-run Chinook salmon. The levees in the area have failed repeatedly since their construction. CALFED has recommended that the Conservancy work in cooperation with the U.S. Army Corps of Engineers, the Reclamation Board, and Tehama County for consideration. This proposed Deer Creek project compliments this current Corps 1135 proposed project and is located within the same general region.

i. Alternatives Considered.

Alternative 1 is No Action.

Under this alternative, the Corps would not participate in an ecosystem restoration project along the Sacramento River between river miles 218 and 221.

Alternative 2 - River Restoration and Bioengineering Restoration.

Restore up to 4 river miles of Sacramento River - Several measures to restore the Sacramento River meander between River Miles 218 and 221 have been studied by the Department of Water Resources. The least active option is to discontinue maintenance of the rock revetment at river mile 220. If this rock is not repaired and maintained in the future, erosion at the site will resume, increasing the likelihood that the river will recapture Kopta Slough. A second option would be to actively remove or disturb existing rock revetment in order to allow erosion at the site. A third option would be to use heavy equipment to deepen the main overflow channel to let the river recapture Kopta Slough.

Riparian and aquatic restoration along the riverbank. There is also opportunity to transport the rock that has been removed from one site along the Sacramento River to place at another site near Vina Woodson Bridge. A bioengineering method along the shore including new riparian vegetation combined with rock revetment would help reduce any possible erosion that would occur from the Sacramento River reconnecting with the slough. This would involve two reaches up to 1500 feet in length along the river.

Alternative 3 River Restoration, Riparian Restoration and Bioengineering Restoration.

There currently exists opportunity to plant up to 300 acres of riparian vegetation near River Mile 220 between Kopta Slough and the Sacramento River. The land is currently used for open space and habitat and being managed by The Nature Conservancy. The Conservancy has expressed interest in participating in a restoration project that would revegetate some of the land that had been cleared in the past due to old agricultural practices. Alternative 3 could incorporate the above mentioned river restoration and bioengineering restoration and include riparian restoration.

j. Study Methodologies. The Corps would measure stream or habitat function values by using appropriate methodologies such as a habitat evaluation procedure or a quantifiable model that determines habitat units gained and determines the number of acres and creek miles of habitat restored. An incremental cost analysis would be used by the Corps to determine the cost effectiveness of each alternative. Using a geomorphic approach, site suitability investigation would be performed for the project site to determine the preliminary design of restoration work.

The suitability investigation would focus on soil, geomorphic, and hydrologic characteristics that influence planting and sustainability of aquatic, riparian, seasonal wetland, and associated terrestrial habitats. A suitability investigation for the most safe and effective bioengineering method would include: river assessment, channel depth, width, side slopes of the channel, measured cross sections, bed gradient, bed and bank material, discussion of dominant processes acting on the site, limiting velocity and shear criterion, fluvial geomorphology and classification, treatment strategies based on classification, stone sizing, classification and sediment grade. Through iteration, the Corps and the non-federal sponsor would review the general plan formulation process, feasibility study reports, environmental assessment, outputs, and design plan. During the plan formulation process in the feasibility phase, the development of alternative plans would include public involvement and input.

4. Consistency Statement. The proposed modification does not appear to impact the authorized project purposes. Due to natural changes in the alluvial river meander migration of the Sacramento River historically to present day – conditions have changed which do not require rock revetment in the original locations where they were once placed. Lands once used for agricultural purposes are now lands in open space for habitat being managed by several different resource agencies in and surrounding the study area.

5. Views of Sponsor. The State Reclamation Board would be the non federal sponsor responsible for representing the Woodson Bridge restoration project as described in this PRP and for providing cost-share funding. A letter of intent submitted with this PRP will be obtained from the non-federal sponsor prior to transmittal.

6. Views of Federal, State, and Regional Agencies. At this time the State Reclamation board has indicated that they are willing to work on an ecosystem restoration project in partnership with Tehama County and the U.S. Army Corps of Engineers on this project. The California Department of Parks and Recreation has expressed an interest in this project and asked if they could participate and perhaps partner with the Corps and the County of Tehama as well. The Nature Conservancy has already restored several hundred acres of riparian vegetation and they support this project as well. The U.S. Fish and Wildlife Service, and the Department of Fish and Game, and Bureau of Land Management that own land around the potential study area support the proposed project. Coordination with National Marine Fisheries Service will be required in the detailed project phase and their views are unknown at this time. It is unknown at this time if there is support from any National programs.

7. Environmental Compliance Requirements. For this potential Woodson Bridge restoration project, the Corps, Tehama County and the California State Reclamation Board would comply with the National Environmental Policy Act and California Environmental Quality Act by preparing an environmental assessment/initial study (EA/IS) that would meet Federal and State requirements. The Corps and local sponsor would also ensure that the proposed project complies with Corps policies, regulations, and all Federal and State laws, including the Endangered Species Act, Fish and Wildlife Coordination Act, Clean Water Act, Clean Air Act, and National Historic Preservation Act.

8. Costs and Benefits.

a. Costs. Including the cost of acquiring LEERD's, the proposed project is estimated at $5,010,000. All costs in excess of the $5 million maximum Federal cost share would be the responsibility of the non-Federal sponsor. Refer to paragraph 11 for Financial Data.

Future OMRR&R requirements.

Specific operations and maintenance and relocation requirements would be developed during project construction where specific information on site conditions, types of restoration are known, and availability of as-built plans; however, at this early stage of the project, some generalized OMRR&R requirements can be identified as follows:

- Establishment of the type of maintenance procedures, such as remedial maintenance identified by the results of periodic inspection, scheduled maintenance and emergency maintenance.

- For reconfigured channels and floodplains, selective removal of woody debris may be required to assure dynamic equilibrium in a restored stream corridor.

- Measures intended to enhance fish habitat may require periodic maintenance to deflect flows or protect bank protection. Success requires plants that are well rooted and the stems reach a particular size and density to produce fully effective soil-bioengineered systems.

- Planted vegetation may require irrigation, fertilization, pest control, and occasionally, replanting due to theft.

- Routine maintenance of vegetation may require removal of hazardous trees and branches that threaten safety, buildings, fences, and other structures, as well as maintenance of vegetation along road shoulder, trails, and similar features.

- Mosquito control may be a maintenance concern near inhabited areas.

- For purposes of this PRP, the annual OMRR&R cost is estimated at $20,000.

b. Benefits. Wetlands and riparian ecosystems play an integral role in the ecology of the watershed. The values of these functions to human society depend on a complex set of relationships between the wetland, riparian, and other ecosystems on the watershed. Section 3 describes the expected primary quantitative outputs of the proposed project. Important qualitative ecological components, parameters, or processes gained from this potential ecosystem restoration effort that benefit fish and wildlife include:

- Restores up to 4 River Miles of structure and function of the river within its flood plain, and increases its suitability to reestablish and support wetlands and riparian hydrology and its associated ecosystem.
- Provides up to 300 acres suitable habitat for special status species such as valley elderberry longhorned beetle, bald eagle, Swainson's hawk, western yellow-billed cuckoo, bank swallow, and willow flycatcher.
- Improves wildlife migration by providing continuous riparian corridor
- Decreases water warming by creating up to 1500 feet of shaded riverine aquatic habitat for fish.
- Increases habitat more suitable for native fisheries between River Miles 218 and 221.
- Reduces nonnative invasive plant species.

- Reduces accelerated rates of bank erosion along 1500-foot reach that has been removing riparian habitat for wildlife.
- Increases up to 300 acres of riparian habitat for resident wildlife and migratory neo-tropical birds.
- Increases quantity and diversity of aquatic invertebrates for up to 300 acres.

9. Schedule. The DPR is scheduled for completion by the end of the 3rd quarter of FY04. Plans and specifications are expected to begin in the 4th quarter of FY04, and construction is expected to start in the 2nd quarter of FY05 extending through FY06.

Project Phases:

a. Detailed Project Report. The DPR would develop data and information relative to evaluating alternative plans. To the greatest possible extent, the Corps would use information provided by the Department of Water Resources who spent several years doing extensive data collection and modeling in the study area.

b. Construction. During this phase, construction funds would be committed, project LERRD's acquired if needed, certified, construction contract advertised and awarded, project physically constructed, and post-construction monitoring conducted.

The project would include post-construction monitoring for 3 years following project construction to determine if the predicted outputs are being achieved. The sponsor would conduct this monitoring as part of in-kind work. An adaptive management approach by the Corps and the non-Federal sponsor could be finalized during the construction phase and applied for up to 3 years during post-construction. Due to the uncertainty and nature of the river changing or unknown morphologic features that could be uncovered during construction, it would be prudent to be able to implement an adaptive management approach. During the feasibility phase, performance criteria would be developed. These criteria would serve as a standard for post-construction monitoring. Any major deficiencies would be addressed at that time. The monitoring could include; aerial photos; permanent vegetation transects, survey stations, photo points; piezometer stations; channel surveys; aquatic/fisheries sampling; and preparation of a baseline report (after completion of construction) and monitoring reports. Any monitoring after 3 years would be the responsibility of the non-Federal sponsor.

The morphological features to be monitored after construction are (1) success of erosion control measures, (2) channel bed and bank topography and plan form through annual topographic surveys, (3) bed substrate changes at riffles by conducting pebble counts, (4) water-surface profiles during a range of flows, and (5) sediment transport measurements and observations. The costs of monitoring and adaptive management would not exceed 1 percent and 3 percent, respectively, of the construction costs. These costs would be determined during the feasibility phase.

10. Supplemental Information. The State Reclamation Board will be the non federal sponsor for this project and will provide the non federal portion of funding. It is not known at this stage if the non federal sponsor will be considering contributing part of its share as work-in-kind as this will be discussed at the beginning of the feasibility phase when funding becomes available. Post construction monitoring of the project will be the responsibility of the non federal sponsor and will be developed in the feasibility phase of the project.

11. Financial Data. The County of Tehama and the California State Reclamation Board are dedicated to coordinating with the Corps on this potential project by using staff and County Board member time. It is anticipated that there will be one cost sharing agreement (PCA).

a. Summarized Financial Data. ($1,000)

				Fed Funding needs ($1,000)			
Task	Totals	Non-Fed	Fed	FY 03	FY 04	FY 05	FY 06
	-	25%	75%				
DPR	580		580	200	380		
P&S	300		300		80	220	
Const	4130	1250	2880			2340	540
Total	5010	1250	3760	200	460	2560	540

Notes:
1. Plans and specifications, and construction cost estimates derived from similar recent efforts by the District and other agencies that have recently been undertaken or constructed within district boundaries.
2. DPR and P&S initially Federally financed; the non-Federal share of these costs recovered at the first year of construction.

b. Non-Federal Requirements ($1,000).

Estimated Non-Federal Requirements	
LERRD's	1000$
Cash/Work-in-Kind (25 percent less LERRD's)	250$
Annual Operation, Maintenance Repair, Replacement & Rehabilitation	20$

Notes:
1. LERRD's consist of over 300 acres of state owned (fee title).
2. Operation and maintenance costs estimate based on previous experience with similar projects.

c. Total Project First Cost ($1,000). $ 5010

12. Federal Allocations to Date.

PRP	$10,000
DPR	0
P&S	0
Construction	0

13. Project Schedule for DPR Phase Only.

Task	Duration of Task (in months)
Initiate Investigation	0
Complete Concept Design/Quantities	6
Endangered Species Coordination	3
Complete Draft CAR and Stream Habitat Assessment/HEP	3
Complete Draft Real Estate Plan	2
Review/Coordinate Draft Basis of Design	2
Complete Engineering Basis of Design, Cost Estimate, and Real Estate Plan	3
Draft EA/IS	4
Complete Draft DPR	4
Complete ITR review of DPR	1
Initiate Public Review of EA/IS	1
End Public Review of EA/IS	1
Complete Final CAR and Stream Habitat Assessment/HEP	1
Complete Final DPR and EA/IS	2
Submit DPR/EA/IS to SPD	1
Obtain Commanders Notice	2

Note: Certain activities shown above are done concurrently. Tasks are not conducted in series. The above schedule shows typical durations of the major DPR project activities and the expected time, from start of project, until these activities are completed. While we fully expect to develop cost effective, efficient, and acceptable solutions to habitat degradation, it is possible that these efforts will not result in a plan the local sponsor will not be able to afford or support. This possibility exists with all Feasibility Studies. We recognized these risks are inherent to the restoration design. To reduce these risks, the District has recommended an adaptive management approach during construction to adapt to changing riverine environments. Considering the nature of the restoration project, the needs of the project sponsor, and other processes and program activities, it is expected that this project could be completed within 18 months from the start of the DPR and a Major Subordinate Command review period of

approximately 2 months.

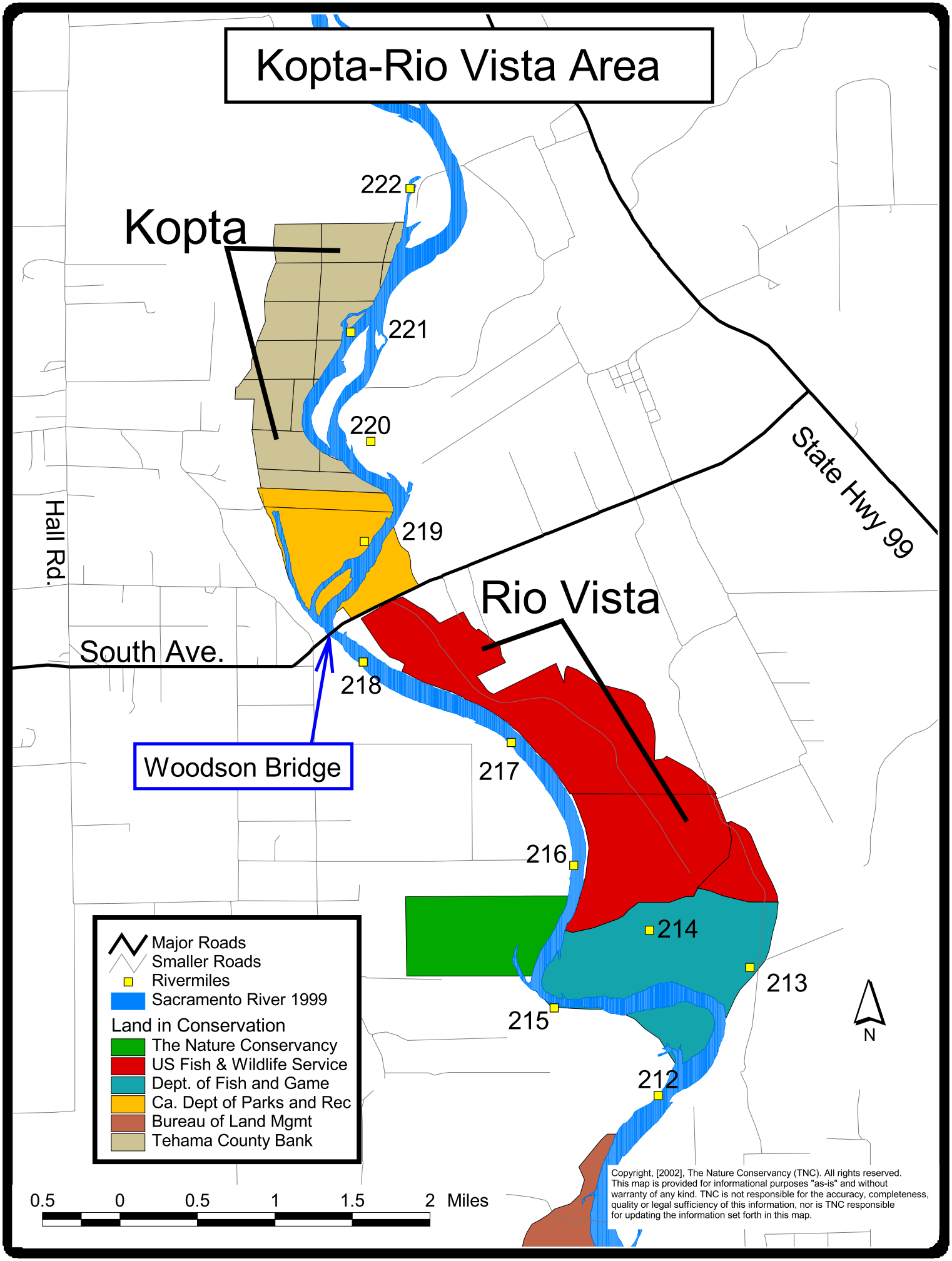
14. Project Budget – DPR Phase. A budget of $ 580,000 is estimated to complete the environmental restoration studies and DPR report (no more than 9 percent of the estimated project cost). This budget is only an estimate and is subject to change during the detailed project report phase. The proposed breakdown of funds is as follows:

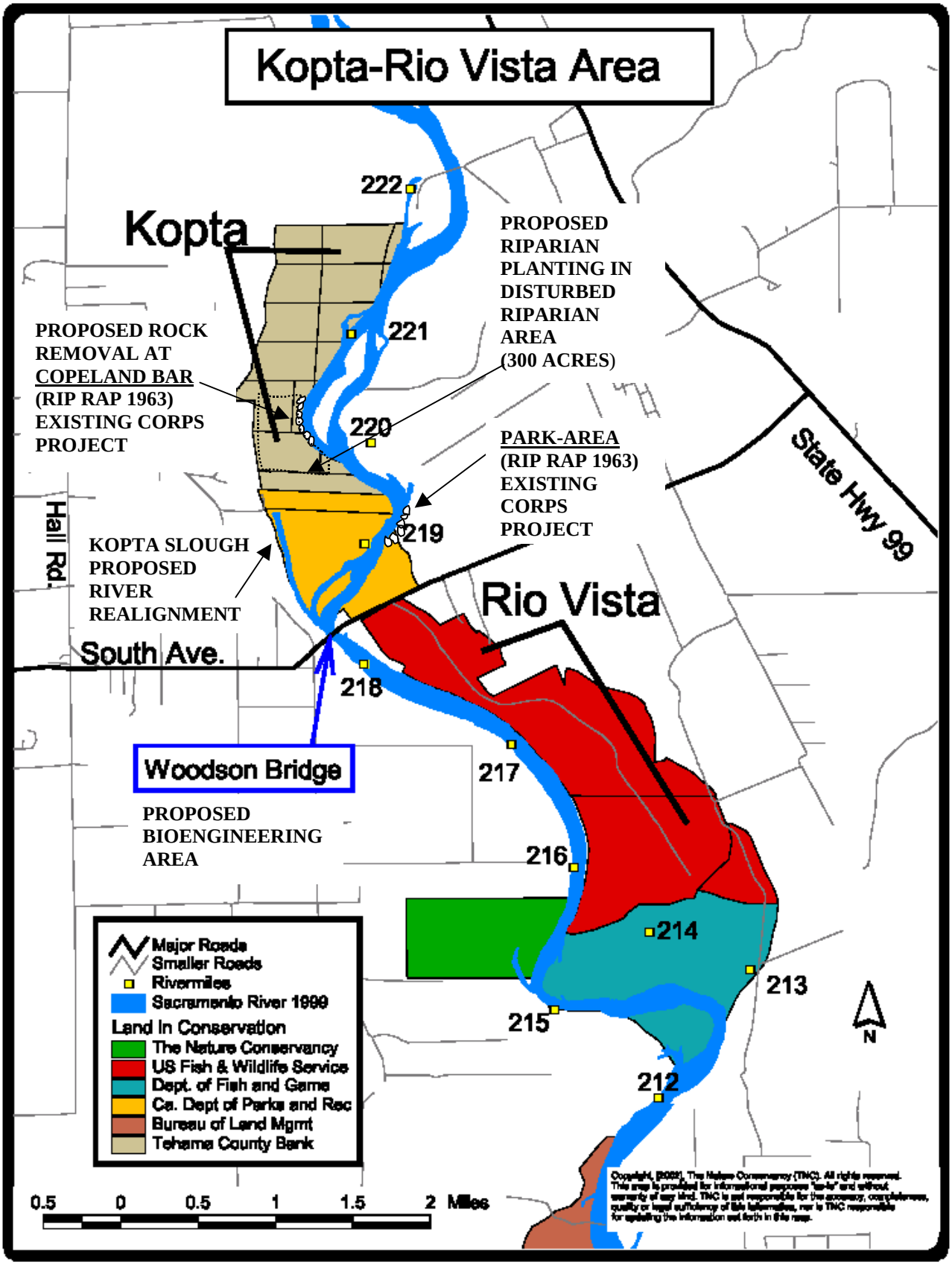
DPR/Feasibility Phase Activities

Task	In-House*	Other Corps and/or Contract*	Sponsor Work-in-Kind
Define project scope, goals, and opportunities	15		
Identify cultural resources	15		
Collect physical data (soils, hydrology, geomorphic)	10	40	
Identify environmental conditions	30		
Determine sponsor/Corps requirements	10		
Establish baseline and future without project conditions	10		
Determine real estate land values	10		
Formulate alternatives	10		
Evaluate alternatives	10		
Cost estimates	5		
Civil design	20		
HTRW considerations	10		
Hydrologic and hydraulic design	20	70	
FWS and NMFS coordination		35	
Select alternative	10		
Draft and Final EA/IS/FONSI/Neg Dec	55		
Write draft and final DPR	55		
Engineering appendix	10	55	
Real Estate appendix	10		
Incremental cost analysis	5		
Prepare MCACES	10		
Release draft EA/IS/FONSI/Neg Dec for public review	5		
Reply to EA/IS comments	15		
Conduct ITR		10	
Send report to MSC for Headquarters' Approval			
Contingency	20		
Total Cost Estimate	**$370**	**$210**	**N/A for feasibility Phase**
Total DPR Estimate, including $20K Contingency	**$580**		

*****In thousands of dollars.

Note: Sponsor work-in-kind credits are only allowed after the execution of a cost-sharing agreement. No feasibility phase cost-sharing agreement is expected.


Kopta-Rio Vista Area
Kopta
Rio Vista
222
221
220
219
218
217
216
214
213
215
212
Hall Rd.
South Ave.
State Hwy 99
Woodson Bridge
Major Roads
Smaller Roads
Rivermiles
Sacramento River 1999
Land in Conservation
The Nature Conservancy
US Fish & Wildlife Service
Dept. of Fish and Game
Ca. Dept of Parks and Rec
Bureau of Land Mgmt
Tehama County Bank
0.5 0 0.5 1 1.5 2 Miles
N
Copyright, [2002], The Nature Conservancy (TNC). All rights reserved.
This map is provided for informational purposes "as-is" and without
warranty of any kind. TNC is not responsible for the accuracy, completeness,
quality or legal sufficiency of this information, nor is TNC responsible
for updating the information set forth in this map.


Kopta-Rio Vista Area
Kopta
Rio Vista
222
221
220
219
218
217
216
214
213
215
212
PROPOSED ROCK REMOVAL AT COPELAND BAR (RIP RAP 1963) EXISTING CORPS PROJECT
PROPOSED RIPARIAN PLANTING IN DISTURBED RIPARIAN AREA (300 ACRES)
PARK-AREA (RIP RAP 1963) EXISTING CORPS PROJECT
KOPTA SLOUGH PROPOSED RIVER REALIGNMENT
PROPOSED BIOENGINEERING AREA
Woodson Bridge
Hall Rd.
South Ave.
State Hwy 99
Major Roads
Smaller Roads
Rivermiles
Sacramento River 1999
Land In Conservation
The Nature Conservancy
US Fish & Wildlife Service
Dept. of Fish and Game
Ca. Dept of Parks and Rec
Bureau of Land Mgmt
Tehama County Bank
0.5 0 0.5 1 1.5 2 Miles
N

Proposal to Complete a Feasibility Study for Kopta Slough Flood Damage Reduction and Habitat Restoration Project

Drafted by DWR Northern District
2007

Proposal to Complete a Feasibility Study for the Kopta Slough Flood Damage Reduction and Habitat Restoration Project

Project Goals and Elements

The Kopta Slough Flood Damage Reduction and Habitat Restoration Project (the Project) is located on the Sacramento River in Tehama County between River Mile 218 and 223. The Tehama County Highway A9 Bridge (Woodson Bridge) bisects the lower portion of the project area (see attached maps). The goals of the Project are to:

1) provide flood damage reduction benefits through reduced bank erosion to protect public resources;

2) provide advance mitigation credits for projects on State-maintained Central Valley Flood Control facilities (DWR Flood Control Projects) for mixed riparian forest habitat, including habitat for valley elderberry longhorn beetle (VELB);

3) along 5,600 feet of river channel bank and over 700 acres of floodplain, provide ecosystem benefits through the restoration of natural fluvial and floodplain processes and mitigate for the loss of shaded riverine aquatic (SRA) habitat from DWR Flood Control Projects;

4) establish long term public ownership of the Kopta Slough property to protect public trust resources and expand recreational opportunities for the people of the State of California on a portion of the project area, including camping, hiking, picnicking, and equestrian use.

These goals would be accomplished through implementation of the Project elements described below. These elements would be assessed in a feasibility study to be prepared by the Northern District office (ND) of the Department of Water Resources (DWR). The results of the feasibility study will be used to decide whether to proceed with the Project. Decision criteria will include benefit/cost ratio, the significance of non-monetary benefits, determination of the project beneficiaries, and how much each beneficiary will contribute to implementing the project. The study will include assessment of impacts related to: flood management; geomorphology; threatened, endangered and sensitive species; sensitive habitats; existing infrastructure; land use; cultural resources; and recreation. The study will assess project alternatives and costs with a preferred alternative being recommended based on the decision criteria. The feasibility study would cost $333,325 to complete (see attached budget). DWR's portion of the cost would be $275,325. Tehama County and California State Parks are each providing $25,000 in cost share funding for the study ($50,000 total) while the Sacramento River Conservation Area Forum (SRCAF) is providing $8,000 of in-kind services for their cost share.

The feasibility study will build upon the work already completed by the US Army Corps of Engineers (ACOE) for this project. Results from the ACOE's reconnaissance level analyses are shown in Tables 1 and 2 to help demonstrate several of the alternatives to be considered and the initial cost estimate associated with each.

Elements of the Kopta Slough Flood Damage Reduction and Habitat Restoration Project include:

1) Protect the west abutment of Tehama County's Woodson Bridge and the City of Corning sewer outfall.

2) Transfer the 708-acre Kopta Slough property from the California State Controller's Environmental Trust to the State of California for management by California State Parks (State Parks). This element could include expansion of the Woodson Bridge State Recreation Area to the west side of the Sacramento River, thus increasing public recreational opportunities and facilitating management of the adjacent 176-acre mitigation area by State Parks.

3) Remove unnecessary revetment along 5,600 feet of the riverbank at the Kopta Slough property to restore fluvial and floodplain processes and mitigate for the loss of shaded riverine aquatic (SRA) habitat from DWR Flood Control Projects.

4) Reduce the riverbank erosion rate within the Woodson Bridge State Recreation Area to preserve heritage oak trees and developed camping, picnicking and recreational facilities.

5) Restore 176 acres of mixed riparian forest habitat on the Kopta Slough property as mitigation for DWR flood control projects.

Under the first element, the Woodson Bridge abutment and land downstream from the bridge adjoining the City of Corning sewer outfall would be protected from erosion. A total 2,600 feet of bank protection would be needed, resulting in 1,900 feet of bank protection to stabilize the Woodson Bridge abutment and 700 feet of bank protection to protect the City of Corning sewer outfall. Several options were analyzed during the 2003-04 ACOE reconnaissance study; the options analyzed are presented in Table 1 with costs based on 2004 estimates.

Table 1. Options for bank protection at Woodson Bridge and City of Corning sewer outfall.

Protection Option	Woodson Bridge Western Abutment		City of Corning Sewer Line Outfall	
	Volume (yd^3)	Cost	Volume (yd^3)	Cost
1. Bank Rock	9,820	$1,275,100	2,600	$357,300
2. Low Berm / Rock**	13,900	$1,725,950	5,350	$661,200
3. Spur Dikes / Bendway Weirs	5,035	$746,400	1,770	$265,600

**preferred alternative in 2003-04

Under the second element, State Parks, after acquiring title, would incorporate the Kopta Slough property into the existing Woodson Bridge State Recreation Area (see attached maps). State Parks would develop a recreation management plan for the area that would describe recreation uses and opportunities for the property. The property will include mitigation areas and habitats of high conservation value; therefore, the extent and type of recreation uses will have to be designed such that they do not conflict with the ecological objectives to be defined for these areas.

Under the third element, different alternatives for the removal of revetment along the east bank of the Kopta Slough property will be analyzed for their cost/benefit through the feasibility study. In concept, removal of this revetment would restore natural channel processes and promote the process of forest succession that would lead to the regeneration of a diverse mosaic of forest types on the floodplain. Restoration of these elements will increase aquatic habitat diversity as well through the creation of channel features such as side channels, mid channel bars, and in-channel large woody debris (LWD). Removal of revetment will also enhance the quality of SRA habitat by increasing exposed root structure and LWD along the bank. As such, this element would be used to provide advanced SRA mitigation for future DWR flood control projects. The amount of SRA mitigation credit would need to be determined later since some components of SRA habitat already exist along the revetted bank and some temporary damage to the existing habitat (i.e. removal of trees to excavate revetment) could occur. Temporary damage to SRA habitat would be subsequently replaced with higher quality SRA as described above. Alternatives to be considered for this element include no revetment removal, partial revetment removal, notching the revetment at intervals along its length, and full removal of the revetment. These alternatives were identified in the 2003-04 ACOE reconnaissance study with their quantities of rock that could be removed and their associated costs (Table 2). Costs are based on 2004 estimates.

Table 2. Options for rock removal at Kopta Slough.

Vertical Removal Option	Options for Kopta Slough Rock Removal			
	Partial Length (2,910 ft)	Full Length (5,660 ft)	Notching Partial Length (1,500 ft)	Notching Full Length (2,500 ft)
1. Partial Vertical (1.48 yd3/Ln ft)	4,306 yd3 $279,900	8,377 yd3 $544,500	2,220 yd3 $144,300	3,700 yd3 $240,500
2. Full Vertical (2.8 yd3/Ln ft)**	8,148 yd3 $529,600	15,848 yd3 $1,030,120	4,200 yd3 $273,000	7,000 yd3 $455,000

** preferred alternative

Under the fourth element, no physical structures are proposed to protect the east bank of the Woodson Bridge State Recreation Area. Rather, reducing erosion on the Woodson Bridge State Recreation Area will be an important objective to achieve as part of the removal of revetment from the east side of the Kopta Slough property (west riverbank). Along with the removal of revetment, the feasibility of constructing a pilot channel to facilitate re-establishment of the river's historical channel alignment through Kopta Slough would be investigated. Re-establishment of this alignment could substantially reduce the erosive forces that are impacting the recreation area. Erosion is causing the loss of park property and valuable heritage oaks at this site and has been exacerbated by the stabilization of the opposite upstream bank along the Kopta Slough property. The Palisades project was constructed at this site to stop erosion in 1986; however, ninety percent of the Palisades failed, and all but 10 percent of the Palisades were later removed in 1997.

Under the fifth element, 176 acres of mixed riparian forest would be restored on land within the Kopta Slough property that is currently supporting field crop agriculture. This would provide advance mitigation credits for DWR Flood Control Projects within the region, including mitigation credits for valley elderberry longhorn beetle (VELB).

Discussion

DWR's Long Term Involvement in the Project

DWR's involvement in the Palisades Demonstration Bank Protection Project for the Woodson Bridge State Recreation Area started with its planning and construction in 1986. Instituted by the Reclamation Board, DWR implemented the Palisades Project in coordination with the ACOE as part of the Sacramento Bank Protection Project, Chico Landing to Red Bluff as a more environmentally benign way to reduce erosion on the State Parks' Woodson Bridge State Recreation Area. After the project was damaged by the 1997 flood and deemed

a serious public hazard, ND managed the effort to remove almost all of the Palisades Project. This effort by ND also included the development and analysis of eight alternatives to address long-term solutions for erosion along the recreation area, all of which are detailed in the "Woodson Bridge State Recreation Area Long-Term Solutions Study Working Draft" (Long-Term Solutions Study).

Accomplishment of State Plan of Flood Control Objectives

The multiple objectives of this project support those identified for the State Plan of Flood Control (Senate Bill 17). The restoration and transfer of ownership elements of this project provide a prudent solution to mitigation needs for DWR's flood management programs and its obligation to implement actions that promote natural dynamic hydrologic and geomorphic process under the State Plan of Flood Control. This project would also support the State Plan of Flood Control objectives by increasing and improving the quantity, diversity, and connectivity of riparian, wetland, floodplain, and SRA habitats. The removal of unnecessary and damaging revetment will also accomplish the objective of minimizing flood management system operation and maintenance requirements.

Restoration projects completed within the last ten years that restore floodplain, geomorphic, and hydrologic function within the central valley have cost between $1.5 and $4 million to construct per mile of river channel/floodplain restored, depending on the level of earth moving and re-vegetation that was needed. The Project is well within this cost range. There is also the benefit of having advanced mitigation of at least 176 acres, which could be worth between $7.0 and $8.8 million[1].

Value to Stakeholders

Monetary and planning support for this project comes from Tehama County, California State Parks, The Nature Conservancy, and the Sacramento River Conservation Area Forum. Broad public and further resource agency support including the Department of Fish and Game (DFG) and the United States Fish and Wildlife Service (USFWS) was also expressed during the initial ACOE study of this project and no irreconcilable issues were identified then or since. Accomplishment of all five of the project's goals has been recognized as very important for sustaining support for this project.

Feasibility Study Scope of Work

General Scope

The initial planning step for this project would be to complete a feasibility study. The results of the feasibility study will be used to decide whether to proceed with the Project. Decision criteria will include benefit/cost ratio, the significance of non-monetary benefits, the identification of project beneficiaries, and the extent for which each beneficiary will contribute to implementing the project. The study

[1] To purchase an acre of mitigation from a mitigation bank can cost between $40,000 and $50,000 per acre for riparian forest. The cost of Shaded Riverine Aquatic Habitat would be about three or four times this cost.

will include assessment of impacts related to flood management; geomorphology; threatened, endangered, and sensitive species; sensitive habitats; existing infrastructure; land use; cultural resources; and recreation. The study will also assess project alternatives and costs with a preferred alternative being recommended based on the decision criteria. The feasibility study will build upon the work already completed by the ACOE for this project.

The components of the study are outlined for each study task below. The budget for each task is outlined in Attachment A.

Task 1. Project Management

Project management by ND will include coordinating study tasks, managing contracts and budgets, monitoring progress, and ensuring timelines are met. The project manager would meet periodically with the ND Water Management Branch Chief, the ND Chief, and Division of Flood Management's (DFM) program manger to assess if project direction is in alignment with the needs of decision makers. This task will also include working with SRCAF to coordinate and facilitate project partner meetings. The project manager would also receive input from SRCAF's technical advisory committee (TAC) and provide materials and presentations for public outreach. Furthermore, the project manager would coordinate with ACOE to facilitate the exchange of study information and to assess and report on the needs of the ACOE for de-authorizing the Sacramento Bank Protection Project revetment within the study area.

> *Deliverables: Regular communication and correspondence with DFM's program manager and ND regarding the feasibility study's progress, budget, and findings. A summary of input and participation from project partners will be completed. A section on process for ACOE's de-authorization of revetment will be developed for the final report.*

Task 2. Public Outreach

Under the public outreach task, the SRCAF will provide in kind cost share. SRCAF will facilitate coordination, collaboration, and communication among governmental agencies, partners, citizens, and local watershed groups. They will provide education and outreach activities that would inform the public on the concepts and issues associated the project. The SRCAF watershed coordinator will ensure appropriate outreach to local stakeholders by coordinating public information meetings, responding to stakeholder concerns, providing updates at SRCAF TAC meetings and Board of Director meetings, and attending Tehama County Board of Supervisors meetings. Additionally the SRCAF watershed coordinator will continue to work with the Tehama County Resource Conservation District and the Deer Creek Watershed Conservancy to ensure that all projects within this watershed, or affecting it, are coordinated.

Deliverables: SRCAF will provide meeting agendas and meeting notes for project partner meetings, public meetings, and TAC meetings and will provide a summary of outreach activities to be included in the final report.

Task 3. Conceptual Alternatives Write-Up

ND would develop the conceptual alternative descriptions, tables, and figures for use by the project team and consultant for analysis and inclusion in the feasibility study. Information for each alternatives would come from the ACOE's reconnaissance study and DWR's Long-Term Solutions Study.

Deliverables: Conceptual alternatives write-up.

Task 4. Environmental Analysis and Feasibility

Biological Resources

In the feasibility report, ND would describe the existing condition and ecological value of aquatic and terrestrial habitats along with the wildlife, fish, and plant species that occur or have the potential to occur in the project area. To determine the likelihood for species to occur within the project area, ND would conduct reconnaissance level surveys for special status species. Surveys would be carried out for bald eagle, Swanson's hawk, yellow billed cuckoo, bank swallow, elderberry, and sensitive plants. The extent of invasive plant species would also be characterized. Collected data will be captured on field forms and a Global Positioning System (GPS), for later transfer to the project Geographic Information System (GIS), which is described in Task 5. Lists will be generated for those species documented during field surveys, and any special-status plant or animal populations and occurrences will be mapped.

ND would assess the positive and negative impacts to sensitive species from each alternative along with the effort needed to comply with environmental guidelines, regulations and laws, and the relative cost for compliance under each alternative. Mitigation or avoidance measures needed for each alternative will also be described and relative cost estimated.

As part of this task, ND would also assess the ecological benefits from each alternative. Water depths, flood regime, sediment deposition, scour rates, elevation above the river, and substrate types will all determine the habitat potential. Therefore, the hydraulic modeling and geomorphologic analyses will provide important characterization of physical parameters that are needed to assess the development and sustainability of particular habitat types, including those types needed for advanced mitigation. The cost needed to establish habitats for mitigation would be assessed as well along with an assessment of net benefit to SRA habitat for each alternative.

Deliverables: Species occurrence records and GIS data. Fisheries, wildlife, plant, and ecological impact feasibility report sections.

Cultural Resources

The cultural resources task will be completed by the Division of Environmental Services. Cultural resources studies for the proposed project will involve a review of records maintained at the Regional Information Center of the California Historic Resources Information System and a search of the sacred lands files at the Native American Heritage Commission. Native Americans who are knowledgeable about the project area will also be contacted for pertinent information. Following the records search, a pedestrian survey will be conducted of the project area. Any cultural resources identified as the result of the inventory will be recorded and photographed. A report will be prepared and included in the feasibility study to document the survey and the results of the effort.

Recreation

Under the recreation task, ND will describe the recreation opportunities with and without the project alternatives and the beneficial and negative impacts to and from recreational use. ND would also assess impacts from management of the area for recreation to habitats that would be managed for mitigation purposes.

Deliverables: Recreation section for feasibility study.

Task 5. GIS Development

GIS support for the project will be provided under this task, including the creation of a project GIS (project level GIS database) and project map support for presentations and the feasibility report. To develop the project GIS, ND will collect and review existing biological data from DWR, CDFG, USFWS, other public agencies, and adjacent landowners that are relevant to the project area. A GIS database will be created to maintain and update this information as needed. Furthermore, topographic and bathymetric data would also be incorporated into the project GIS along with modeling results. The project GIS would include historical channel meander and predicted meander as a result of project alternatives.

The project GIS will be used to aid the feasibility analysis, organize and store spatial project information, and to create project maps for presentations and the feasibility report.

Deliverables: Project GIS and project maps for report and presentations.

Task 6. Geomorphic Assessment

River Movement and Feasibility Chapter
ND would provide an analysis of existing river migration monitoring performed since 1988, and results of Dr. Larson's river migration modeling. This task would include a discussion of existing rates of migration projected with each alternative and with no project.

Erodibility Assessment and Feasibility Chapter
ND would acquire and review existing soil boring and test pit data performed by ACOE. There would be no new data acquisition. ND would assess the likelihood of channel cutoff through the area of historic (1896-1923) channel with and without assistance. This task would also include an assessment of bank stability of the right bank with the relocated channel in place and a discussion of options for rip-rap removal under each alternative (full, partial, notched, etc).

Deliverable: Assessment of river migration and erodibility sections for feasibility report. ACOE boring and test pit data.

Task 7. Engineering Analysis and Feasibility
The engineering analysis will consist of developing a two-dimensional hydraulic model, analyzing project alternatives and costs, and preparing an engineering analysis report. A combination of consultant services and ND review and coordination will be used to complete this task. The consultant services will be administered by ND.

Consultant Services
A consultant services contract will be used to complete the engineering analysis study with the final study report becoming incorporated as an appendix to the feasibility report. ND will develop the scope of work and contract for the project. To conduct the analysis, the consultant will develop a two-dimensional hydraulic model using existing topographic information from the Sacramento and San Joaquin River Basins Comprehensive Study with current channel conditions and overbank condition to be defined by updated bathymetric and land surveys as described in the next section. ND will work with the consultant to refine project alternatives to be analyzed. The consultant will analyze the effects and cost of actions including bank protection, complete or partial removal of existing revetment, and pilot channel development. With ND guidance and review, the consultant will complete a final report that will be included as an appendix for the feasibility report.

Deliverables: see sections below.

Bathymetric and Land Surveys and Mapping
Combine existing triangular irregular networks (TIN) from previous studies along the Sacramento River and Deer Creek into one TIN for the study area. The combined TIN would then be updated to represent the current

topography of the study area. The main focus of the work would revolve around areas that have changed since the existing TINs were created. ND anticipates this being the in-channel and top of bank portions of the TIN. The overbank areas of the TIN will be checked for accuracy.

ND would conduct the survey using Real-Time Kinematic (RTK) Global Positioning System (GPS) technology and conventional survey equipment. The GPS survey instruments will be a Trimble 4000SSI receiver at the primary control point and Trimble 4700 receivers as the rovers. These survey-grade receivers provide centimeter level accuracy in both the horizontal and vertical positioning. During the bathymetric process, the RTK GPS supplies the horizontal and vertical position of the bathymetric GPS antenna. The conventional survey equipment will be a survey control quality Geodimeter 600 series total station.

The bathymetric soundings will be acquired with a Knudsen Engineering Limited 320B/P survey-grade echo sounder and transducer. This type of echo sounder is an acoustic echo ranging device; depths are calculated by measuring the time it takes for a pulse of ultrasound to be transmitted downward from the transducer, reflect off the bottom, and return to the transducer.

The combined TIN will be updated from the points collected in the field and visually checked for anomalies or errors. The final product will be a TIN that will produced maps at 1 inch = 50 feet with a 2-foot contour interval. All field work and office processing will conducted by, or under the direction of, a Licensed Land Surveyor.

Deliverables: The final TIN of the study area will be provided in DXF format on a CD. The 2-foot contour map of the study area will also be provided on the CD in AutoCAD and DXF format. The contour map and TIN will be incorporated into the project GIS.

Coordinate and Review Hydraulic Modeling

The consultant will develop a two-dimensional hydraulic model using the ACOE's RMA-2V program. The two-dimensional model will provide velocity, depth, and shear stress data at each point within the finite element network. Model runs will consist of evaluating existing conditions and project alternatives for the following conditions: the calibration flow; the bankfull discharge (i.e. a 2- to 3-year flow event); the 10-year discharge; and the 100-year discharge. DWR will review the model runs, input parameters and assumptions, and output to ensure representation of current conditions and provide feedback on the refinement of project alternatives.

Deliverables: The consultant will develop and provide to DWR a calibrated hydraulic model with existing and project alternative model runs. Full

documentation model documentation will be provided. Plots of velocity, depth, and shear stress will be incorporated in the project GIS.

Develop and Review Project Alternatives and Costs

The project alternatives as defined above in Task 3 will be further refined by the consultant with guidance from ND.. The consultant will develop the costs associated with the refined conceptual project designs. The results will be reviewed by ND

Deliverables: The consultant will develop and provide preliminary designs and costs for each alternative.

Coordinate and Review Consultant's Report

ND will coordinate the consultant's services to produce an engineering analysis report that will be included as an appendix within the feasibility report. The engineering analysis report will include model documentation, determination of input parameters, calibration, existing conditions and alternative hydraulic modeling results, refined conceptual designs of bank protection and revetment removal, and costs by alternative and conceptual design. The information development for this engineering analysis report will become input to the feasibility report.

Deliverables: The consultant will prepare an engineering analysis report for use by DWR that includes refined conceptual designs and accurate cost estimates for each alternative.

Task 8 Final Feasibility Report Preparation

Recommendations and Conclusions

ND would analyze and summarize the results of the environmental, geological, and engineering investigations for making recommendations and conclusions within the feasibility study. The summary would include a matrix indicating the cost and impact to physical, biological, cultural, recreational resources, and stakeholder interests for each alternative. The recommended alternative would be the one that best balances cost with the level of benefit and does not have issues associated with it that are immitigable or irreconcilable.

Deliverables: Recommendations and conclusions section of feasibility report.

Prepare final DWR report for Publication

ND would review the report for consistency and quality of analysis and provide edits to prepare it for submittal to the Publication Unit within DWR's Division of Planning and Local Assistance (DPLA).

Deliverables: Administrative draft of feasibility report with recommendations and conclusions.

DWR Publications

DLPA's Publications Unit would provide final grammatical and formatting edits, review for consistency, and suggest rewrites to the document. Publication would also create a CD of the consultants report for inclusion in the feasibility report and create a PDF for website distribution. Publications would for submit the report to DWR's Executive Branch for review. The final document would be produced as a district report. It would be available in hard-copy format on a limited basis; otherwise, distribution will occur electronically through PDF files on CD as requested or for download from ND and SRCAF's websites.

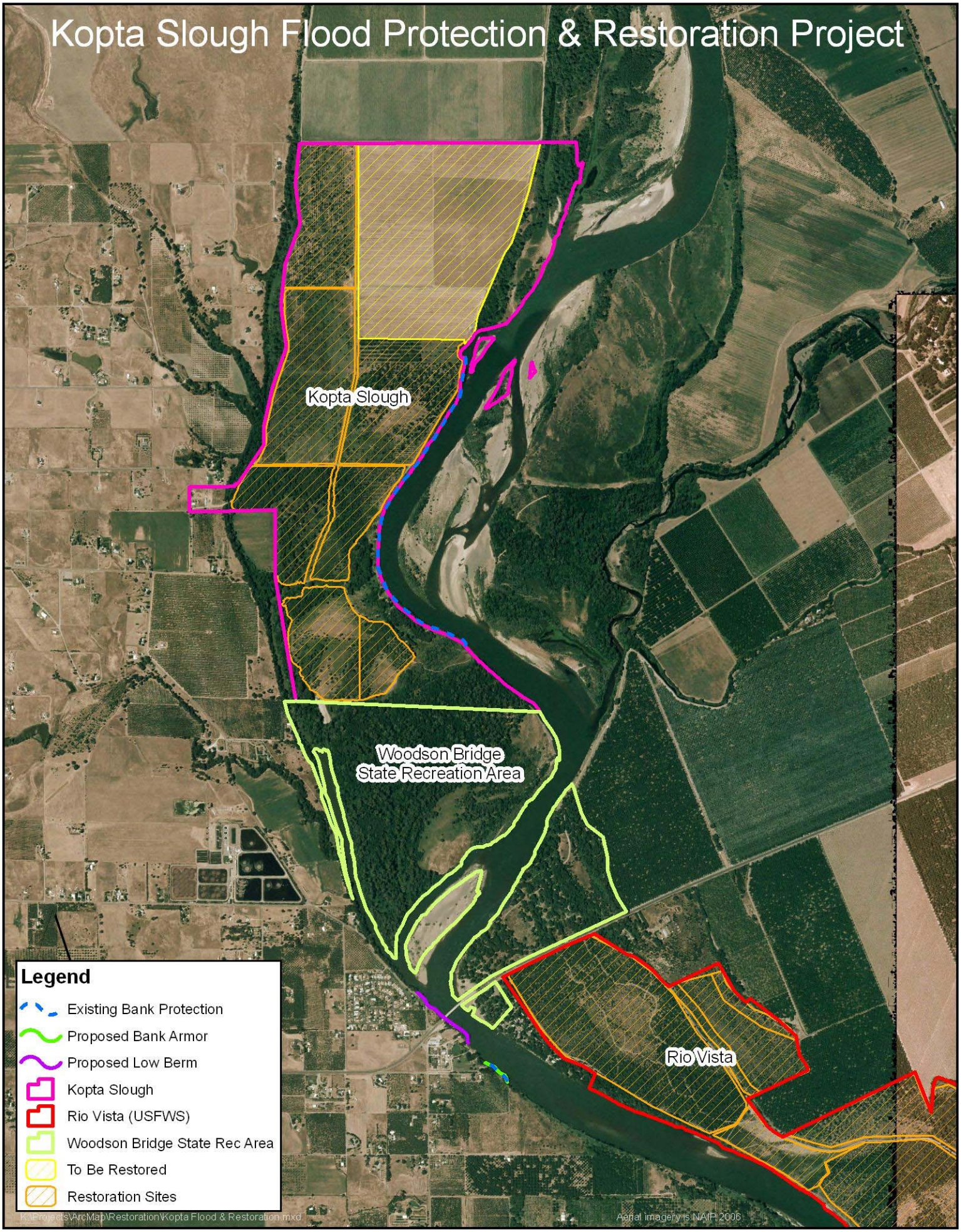
Deliverables: Final feasibility report with recommendations and conclusions available for distribution to public.

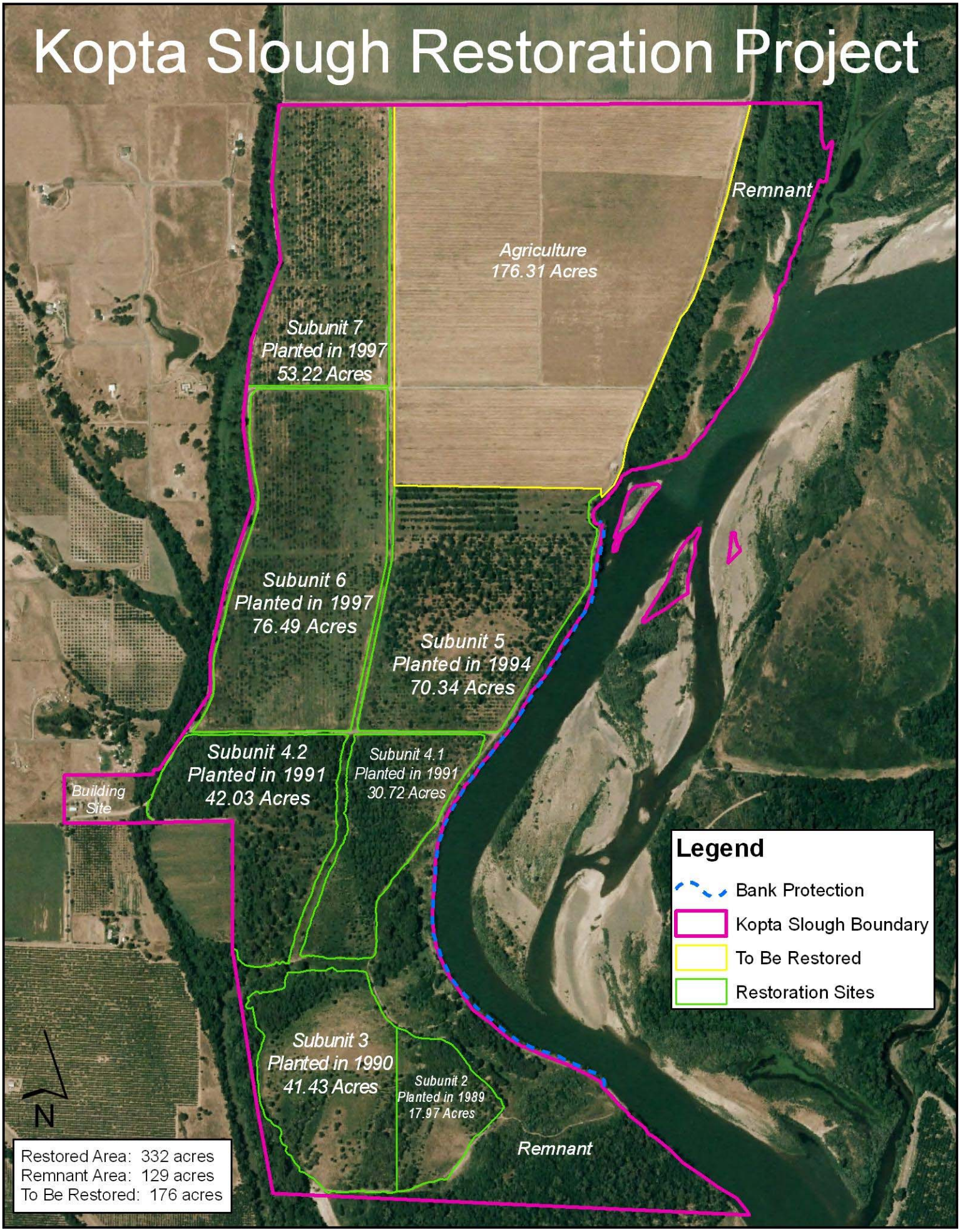
Attachment A

Kopta Slough Flood Damage Reduction and Habitat Restoration Project Feasibility Study
Budget by Task

FEASIBILITY STUDY TASKS	*Entity*	*Hours*	*Labor Rate*	*Labor Cost*	*Exp*	*Total*	*Schedule for FY 08 & 09*
Task 1 – Project Management							
1.1 – Project Coordination	**DWR**	56	95	$ 5,320		$ 5,320	
1.2 – Budget Management	**DWR**	80	95	$ 7,600		$ 7,600	
1.3 – SRCAF TAC and Public Meetings	**DWR**	56	95	$ 5,320		$ 5,320	**Mar-Jan**
1.4 – ACOE Coordination and Assess De-authorization Process	**DWR**	35	95	$ 3,325		$ 3,325	
Subtotal		***227***				***$ 21,565***	
Task 2 – Public Outreach	**SRCAF***			$ 7,000	$ 1,000	$ 8,000	**Mar-Jan**
Subtotal						***$ 8,000***	
Task 3 – Conceptual Alternatives Write-Up	**DWR**	40	95	$ 3,800		$ 3,800	**Apr-May**
Subtotal		***40***				***$ 3,800***	
Task 4 – Environmental Analysis & Feasibility							
4.1 – Biological Reconnaissance Surveys	**DWR**	176	95	$ 14,080	$ 1,000	$ 15,080	
4.2 – Cultural Resources Record Search and Consultation	**DWR**	24	95	$ 1,920		$ 1,920	**Mar-Jun**
4.3 – Wildlife, Plant, Fisheries, Cultural Resources, Ecological, and Recreation Feasibility Chapters	**DWR**	250	95	$ 22,500		$ 22,500	**Apr-Dec**
Subtotal		***450***				***$ 39,500***	
Task 5 – GIS							
5.1 – Survey Support	**DWR**	44	95	$ 4,180		$ 4,180	
5.2 – Existing Condition	**DWR**	24	95	$ 2,280		$ 2,280	**Apr-Dec**
5.3 – Report Map Production	**DWR**	40	95	$ 3,800		$ 3,800	
Subtotal		***108***				***$ 10,260***	
Task 6 – Geomorphic Assessment							
6.1 – River Movement and Feasibility Section	**DWR**	108	125	$ 13,500	$ 500	$ 14,000	**Apr-Dec**
6.2 – Erodibility Assessment and Feasibility Section	**DWR**	124	125	$ 15,500	$ 500	$ 16,000	
Subtotal		***232***				***$ 30,000***	
Task 7 – Engineering Analysis & Feasibility							
7.1 – Administration of Consultant Service Contract	**DWR**	20	147	$ 2,940		$ 2,940	**Apr-Jan**
7.2 – Consultant Services for Hydraulic Modeling, Alternative Analysis, and Final Engineering Report	**Consultant**	600	150	$ 90,000		$ 90,000	**May-Jan**
7.3 – Bathymetric and Land Surveys	**DWR**	240	142	$ 34,080	$ 2,000	$ 36,080	**May-Sep**
7.4 – Mapping	**DWR**	120	142	$ 17,040	$ 1,000	$ 18,040	
7.5 – Coordinate and Review Hydraulic Modeling	**DWR**	80	147	$ 11,760	$ 3,000	$ 14,760	
7.6 – Analysis of Project Alternatives and Costs	**DWR**	120	147	$ 17,640		$ 17,640	**Jun-Jan**
7.7 – Coordinate and Review Consultant's Report	**DWR**	120	147	$ 17,640		$ 17,640	
Subtotal		***1300***				***$ 197,100***	
Task 8 – Final Feasibility Report Preparation							
8.1 – Recommendations & Conclusions							
8.1.1 – Engineering	**DWR**	20	147	$ 2,940		$ 2,940	**Nov-Dec**
8.1.2 – Environmental	**DWR**	20	95	$ 1,900		$ 1,900	
8.2 – Prepare final DWR report for Publication							
8.2.1 – Engineering	**DWR**	40	147	$ 5,880		$ 5,880	**Dec**
8.2.2 – Environmental	**DWR**	20	95	$ 1,900		$ 1,900	
8.3 – DWR Publications	**DWR**	120	79	$ 9,480	$1,000	$ 10,480	**Jan**
Subtotal		***220***				***$ 23,100***	
Total Feasibility Study Cost						**$ 333,325**	
Cost Share (In kind cost share and contracts to DWR or Consultant)							
Tehama County						$ 25,000	
California State Parks						$ 25,000	
Sacramento River Conservation Area Forum						$ 8,000	
Subtotal						***$ 58,000***	
Total Cost to DWR DFM						**$ 275,325**	

*** Sacramento River Conservation Area Forum**


Kopta Slough Flood Protection & Restoration Project
Kopta Slough
Woodson Bridge
State Recreation Area
Rio Vista
Legend
Existing Bank Protection
Proposed Bank Armor
Proposed Low Berm
Kopta Slough
Rio Vista (USFWS)
Woodson Bridge State Rec Area
To Be Restored
Restoration Sites
K:\Projects\ArcMap\Restoration\Kopta Flood & Restoration.mxd
Aerial imagery is NAIP 2006
Feet
0
1,000
2,000
4,000
6,000
8,000
10,000
12,000
14,000


Kopta Slough Restoration Project
Remnant
Agriculture
176.31 Acres
Subunit 7
Planted in 1997
53.22 Acres
Subunit 6
Planted in 1997
76.49 Acres
Subunit 5
Planted in 1994
70.34 Acres
Subunit 4.2
Planted in 1991
42.03 Acres
Subunit 4.1
Planted in 1991
30.72 Acres
Building Site
Subunit 3
Planted in 1990
41.43 Acres
Subunit 2
Planted in 1989
17.97 Acres
Remnant
Legend
Bank Protection
Kopta Slough Boundary
To Be Restored
Restoration Sites
N
Restored Area: 332 acres
Remnant Area: 129 acres
To Be Restored: 176 acres
0
500
1,000
2,000
3,000
4,000
5,000
6,000
7,000
Feet

Letter Sent to the Corps on April 18, 2008

STATE OF CALIFORNIA – THE RESOURCES AGENCY **ARNOLD SCHWARZENEGGER,** GOVERNOR

CENTRAL VALLEY FLOOD PROTECTION BOARD
3310 El Camino Ave., Rm. LL40
SACRAMENTO, CA 95821
(916) 574-0609 FAX: (916) 574-0682
PERMITS: (916) 574-0653 FAX: (916) 574-0682

April 18, 2008

Colonel Thomas C. Chapman
District Engineer
U.S. Army Corps of Engineers
Sacramento District Office
1325 J Street
Sacramento, California 95814
ATTN: CEPSK-PM-C

Dear Colonel Chapman:

This letter is to inform you that staff will be presenting a resolution to the Central Valley Flood Protection Board (Board) at their May 16, 2008 meeting to submit a letter to the Corps of Engineers (Corps) reaffirming the Board's support for the Continuing Authorities Program Section 1135 Ecosystem Restoration Project at Woodson Bridge (Project). This Project will be of great benefit to the Sacramento River Flood Control Project as it will reduce erosion, restore a natural floodplain, and restore and preserve riparian habitat. For these reasons, it is supported by staff from both the Central Valley Flood Protection Board and from the Maintenance Branch of the California Department of Water Resources (DWR).

After the Board officially approves the Project, a letter of support will be provided reaffirming the Board's intention to enter into a partnership agreement with the Corps and Tehama County that lays out the responsibilities of the partners for sharing in the costs of the Project, acquiring necessary real estate interests, and performing necessary operation, maintenance, repair, rehabilitation, and replacement of the Project.

If you have any questions, you may contact Eric McGrath, System Integrity C Chief, Department of Water Resources, at (916) 574-2243.

Sincerely,

Jay S. Punia
Executive Officer